

# ● PRINTER RUSH ●

(PTO ASSISTANCE)

Application : <u>10/786,357</u>	Examiner : <u>Ghyka</u>	GAU : <u>2812</u>
From: <u>MR</u>	Location: <u>(IDC) FMF FDC</u>	Date: <u>12-02-05</u>
Tracking #: <u>EPM 10786357</u>		Week Date: <u>10-31-05</u>

DOC CODE	DOC DATE	MISCELLANEOUS
<input type="checkbox"/> 1449	_____	<input type="checkbox"/> Continuing Data
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[RUSH] MESSAGE: 1st line of page 1, some text are covered by stamp. Data is illegible.

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Thank you,  
MR

[XRUSH] RESPONSE: \_\_\_\_\_

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REV 10/04

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THERMAL TREATMENT EQUIPMENT AND METHOD FOR  
HEAT-TREATING

Name, ARMANDO CHINER  
(typed or printed)

BACKGROUND OF THE INVENTION

5 The present invention relates to a method for ~~heat treating and a thermal~~  
treatment equipment applying the method. Particularly, the invention relates to the  
thermal treatment equipment heating a substrate or a formed matter on the substrate  
by heated gas and the method for heat-treating using the equipment.

10 In a manufacturing process of a semiconductor device, thermal treatments  
aiming at oxidation, diffusion, gettering, and recrystallization after ion injection  
with respect to a semiconductor or a semiconductor substrate are programmed. A  
typical example of the equipment performing these thermal treatments is a hot wall  
type annealing furnace of horizontal type or vertical type, which is used widely.

15 The annealing furnace of horizontal type or vertical type is batch type  
equipment treating many substrates in a lump. For example, the vertical annealing  
furnace mounts a substrate on a susceptor formed by quartz horizontally and in  
parallel, and performs putting in and out to a reaction pipe by an elevator driving up  
and down. At outer circumference portion of a bell-jar type reaction pipe, a heater is  
20 provided so as to heat a substrate by the heater. It takes comparatively long time for  
rising time reaching the predetermined heating temperature and falling time cooling  
to temperature possible to take out because of the construction thereof.

25 Incidentally, in MOS transistor used for an integrated circuit, very high  
process accuracy is required as elements become fine. Especially, it needs to diffuse  
impurity at the minimum for forming thin junction. However, process taking long  
time for rising temperature and falling temperature as the annealing furnace makes  
forming thin junction difficult.

30 Rapid thermal anneal (described RTA hereafter) method is developed as  
thermal treatment technique performing rapid heating and rapid cooling. An RTA  
equipment heats a substrate or a formed matter on the substrate rapidly using  
infrared ray lamp so as to perform thermal treatment in short time.

→ heat treating and a thermal